Charter Member

Associated Business Papers

Published by
CONCRETE PUBLISHING COMPANY
400 West Madison Street
Chicago, Illinois
Telephone CENtral 8822

●

Louis Brookman, Jr., *Publisher*
L. Moeller, *Circulation Manager*
C. Bachmann, *Ass't Editor*

Representatives

New York City
Ralph C. Sullivan   Carl L. Walker
Room 1112, Grand Central Palace Building
Wickersham 2-1991

Detroit
Warren R. Tarbell   L. L. Parker
14151 Sussex Avenue   Hogarth 6543

San Francisco: Roger A. Johnstone
Room 1009, 155 Montgomery Street

Los Angeles: 315 West Ninth Street

●

The Cement Mill Edition of *Concrete*

The Cement Mill Edition of CONCRETE is edited exclusively for those interested in the manufacture of portland cement and related products.

Its pages are devoted to discussions of plant design, management, operation, production efficiency, chemical research and control, quarry operation, progress and news of the industry.

The Cement Mill Edition also contains all the material published in the corresponding Regular Edition and so provides news of the uses and merchandising of the materials whose manufacture is discussed in the Mill Edition.

The Regular Section furnishes mill operating officials and mill executives valuable points of contact with the users of the materials they produce.

Charter Member

Audit Bureau of Circulations

CEMENT MILL SECTION of

Concrete

Established 1904

Volume 41   October, 1933   Number 10

NORMAN M. STINEMAN, *Editor*
J. C. WITT, *Consulting Editor*

WE DO OUR PART

CONTENTS

Gravity-Unloading Railway Car Transports Bulk Cement *(Illus.)* **26**
Description of new type of unit.

Menace of Silicosis on Increase **28**
Note of warning sounded.

Editorial **30**
Pre-Mixed Masonry Cements.
An Antidote for Over-Specialization.
Credit to the Leaders.

Kinetic Elutriator Speeds Division of Sub-Sieve Particles *(Illus.)* **31**
A. L. Curtis describes procedure in detail.

Huron Operates New Storage Plant *(Illus.)* **33**

Cement Statistics for August *(Illus.)* **34**

New Books and Pamphlets **34**

Personal **34**

High Early Strength with Wet Grinding **35**

Mill Equipment **36**

Copyright, 1933, by Concrete Publishing Co.

INDEX TO ADVERTISEMENTS

Engineering & Designing 22
General Motors Truck Company .... Back Cover
Link-Belt Co. 35

Vol. XLI
No. 10

Cement Mill Section of
Concrete

OCTOBER
1933

Gravity-Unloading Railway Car Transports Bulk Cement

Success Proved in Actual Service—Hopper Bottoms at Angle of 50 Degrees—Unloading Mechanism Is Simple

A NEW bulk cement railway car of the covered hopper, bottom-discharge type, has been developed by the American Car and Foundry Co., 30 Church St., New York. The car is unloaded by gravity.

Tried Out in Actual Service

The car shown in Figure 1 has been tried out in actual service in the East, transporting various dry bulk commodities, portland cement included. Recently this car was brought to the Middle West and was employed in transporting bulk cement from the Oglesby (Illinois) plant of the Lehigh Portland Cement Co. to Dam No. 4 of the Mississippi River development near Alma, Wis.

The limit capacity of the new car is 156,900 lb., or about 78½ tons. On the first trip from Oglesby to Alma it carried 155,500 lb., or nearly 78 tons of cement, amounting to about 413 bbl. On the second trip the weight of cement carried was slightly more than on the first trip. In neither case was the car full. The car, of course, is designed to carry other dry bulk commodities aside from cement, some of which are comparatively light, necessitating a cubic foot volume greater than that required for cement in order that the rated tonnage may be carried. For still lighter commodities, such as lime and light-weight aggregates, a car has been developed that is similar in design but contains three hoppers instead of two.

Hopper Bottoms Have Steep Slope

Readers of the *Cement Mill Edition* of CONCRETE will recall an illustrated article in the issue of July, 1932, describing similar gravity-unloading bulk cement cars which are, in fact, converted hopper cars formerly employed in shipping coal. The essential difference between the new car here illustrated and the converted coal cars described in the former article lies in the fact that the new car has a higher body, and consequently a steeper slope in the hoppers. In the new car the hopper bottom makes an angle of 50 deg. with the horizontal. The difference in the height of the two cars may be seen in Figure 1, where the end of one of the older type may be seen at the extreme right.

The new car, like the other type, has eight covered hatches in the roof, to facilitate loading as well as unloading. The interior of the hoppers is of welded construction throughout, no rivet heads or other projections being in evidence. The smoothness of the interior facilitates the flow of cement.

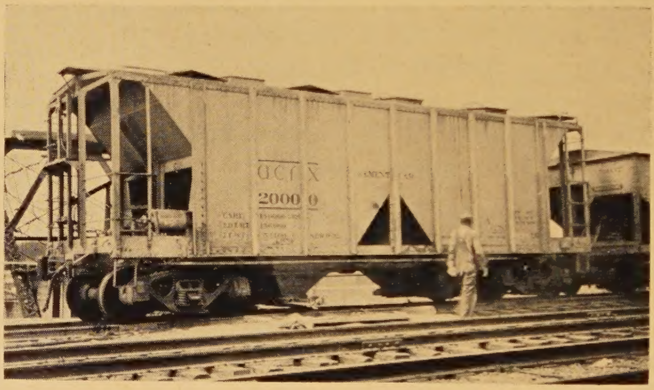


Figure 1. New bulk cement railway car of the gravity-unloading type transports cement from Illinois plant to Mississippi River Dam No. 4

Unloading Mechanism

The American Car & Foundry car, like the type described in the former article, is covered with a steel roof and has a transverse bulkhead through the middle. As the illustrations show, the hoppers discharge through low-

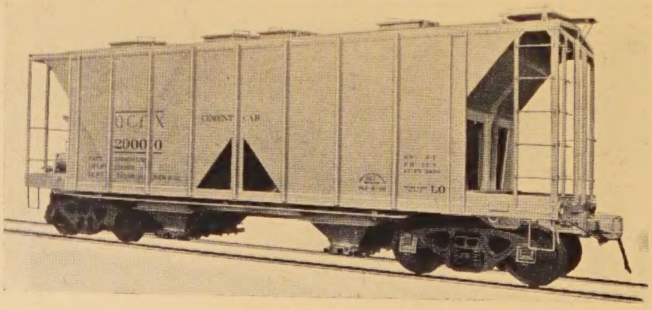


Figure 2. Manufacturer's illustration of new gravity-unloading bulk cement railway car

level openings just over the tracks. Sliding gates keep the hopper outlets closed. These gates are opened and closed by means of a screw working through swivel nuts at the bottom of the hopper. The gates are on rollers and slide against gaskets which line the lower edge of the hopper. This mechanism is very simple and easy to operate. After the screws are started during the operation of opening the gates, they can be operated by hand.

The Unloading Operation

At the construction site the car was unloaded in the usual way. In this case, as in previous cases, two of the ties under the railroad siding were spread apart, and enough space was excavated to permit the installation of a screw conveyor underneath the rails.

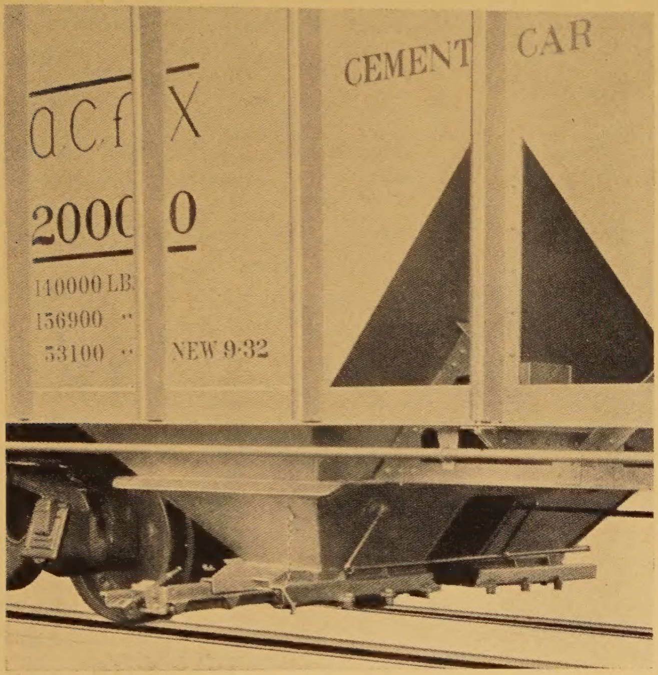


Figure 3. Close view of hopper doors, taken from manufacturer's illustration

At the construction plant at Dam No. 4 this screw conveyor carried the cement to a Fuller-Kinyon pump which, in turn, pumped it for a distance of 250 ft. to the overhead cement bins at the mixing plant.

Only one man was required during the unloading operation, to open the sliding gates, after which he spent some time on the roof to break up points where the cement had packed to the extent of preventing its normal flow. For this purpose the attendant used an ordinary garden spade fastened to the end of a handle about 12 ft. long. It was never necessary for him to go inside the car, since all points could be reached from the hatches.

Cement Protected at Discharge Point

Provision is made against loss of cement at the discharge gate, and for protection against wind and rain. This is accomplished by means of a boot made of an angle-iron frame and a canvas stocking, the boot being attached to the door guide casting and held in place by clamps. The door slides are then opened and the discharge is started.

The average time for unloading a car is two hours, which includes spotting the car, opening the doors, unloading, then locking the doors and hatches for the return trip. The cement storage bins at the concrete mixing plant at Dam No. 4, however, are too small to permit complete unloading of a car at all times. In some cases it was necessary to unload part of the car, then to wait until the concrete mixer used enough cement to provide room for the remaining cargo.

Advantage of Transverse Bulkhead

Mention should be made of a special advantage of the transverse bulkhead which completely separates the two hoppers of the car. This special advantage lies in the fact that a concrete products manufacturer or a material dealer wishing to buy half a carload of a special cement can obtain the carload freight rate if the second hopper is filled with ordinary cement or any other product. In a word, the buyer can buy half a carload of any two products he desires, without having them come into contact with each other. This advantage applies also to the purchase of two sizes of aggregate, which can be shipped in the separate hoppers without being mixed.

This new car should add impetus to the demand for railway cars capable of transporting and unloading bulk cement and similar commodities with a minimum of handling effort.

Chemical Engineering Equipment Institute Organized

On August 28, 1933, an organization was formed by representatives of 35 firms in the chemical engineering equipment industry. According to the by-laws, "The object of this institute shall be to protect, promote, foster, and advance the interests of the members, as manufacturers, designers, erectors and/or distributors of chemical engineering equipment; to increase the use of such equipment; to improve the conditions under which the industry is carried on; to develop fair and just competitive methods; to perfect machinery for the peaceful settlement of disputes between members, or between them and their customers; to protect the industry against unfair and unjust burdens and exactions; to collect and disseminate pertinent data relating to the industry; and generally to do such things as may be necessary to the foregoing results."

A number of the companies represented at the organization meeting supply equipment to cement plants.

Capacity Operation Is Resumed by Cowell Plant

Approximately 200 men returned to work on September 18, when the Cowell Portland Cement Co. plant at Cowell, Contra Costa County, Calif., reopened under a capacity schedule, according to W. H. George, superintendent.

A large portion of the cement going into the Oakland-San Francisco Bay bridge is being supplied by the plant.

Three New Coal Barges to Marquette

Three new barges especially designed for handling coal were delivered to the Marquette Cement Manufacturing Co. from Pittsburgh during the first week in September.

The barges are to be used in the coal trade for that company between Grand Tower and Cape Girardeau, Mo.

Menace of Silicosis on Increase

Taken Up by Racketeers—What Stone Dusts Are Harmful—Cement Dust Is Pronounced Harmless

SILICOSIS has again come to the front as a profitable weapon for racketeering lawyers and shady doctors, due to several recent cases where industrial concerns—and in one case a general contractor on tunnel construction in West Virginia—have had a number of damage suits filed against them.

This pulmonary disease has been given the name of silicosis because of the supposition that its development is due to the presence of fine dust of stone having a high silica content, in the air breathed by the supposedly injured workman. Another name for the disease is pneumonoconiosis.

Claims May be Founded on Fact

The most dangerous feature about the racketeering phase of recent court actions lies in the probability that claims for injury may be founded on some basis of fact. For the most part, however, the situation has been exploited by lawyers, working on a contingent fee basis and acting in conjunction with doctors of doubtful reputation. These racketeers have gone to employees who were laid off in the last two years and readily convinced them that an opportunity was at hand for the collection of a large sum of money. An industrial concern located near Chicago has had more than 100 suits filed against it in the last year, the greater number of them bringing action for damages of $100,000.

In a jury trial the lawyers supported by the testimony of the doctors, invariably paint a tearful story and usually win the case, regardless of what the actual ailment may be. In several cases, however, courts have been inclined to seek more authentic information than that provided by the testimony of the doctors called as witnesses for the plaintiff.

Cement Industry May Be Next

Thus far the racketeers have confined their activities mainly to the industries that produce or use stone or sand having a high silica content, such as foundries and producers of silica sand and silica products.

Nevertheless, the racketeering gentry will probably draw recruits, and the field of their activities will be widened as a direct result of such additions to their number. For this reason cement plant managers should take the necessary precautions now, so as to lessen the possibility of becoming victimized. In a word, the problem should be treated seriously in order that the necessary preventive measures may be applied beforehand.

Harmful and Harmless Stone Dusts

To begin with, authorities seem to be agreed that the dust of certain kinds of stone, if the particles are small enough to enter the lungs, are harmful, and that certain others are harmless.

Dr. C. O. Sappington,[1] director of industrial health for the National Safety Council, classifies stone dust into two groups, one harmful and the other harmless, as follows:

Harmful	Harmless
Silica dust (crystalline silicon dioxide), produced whereever rocks such as granite, quartz, sandstone and quartzite are quarried, crushed or ground.	Non-silica dusts such as coal and lime.
	Dust from limestone, talc, feldspar, clay, emery and carborundum.
	Silicates in which the silicon is chemically combined with other elements.

Dr. Sappington states further that the only silica dust particles that can cause trouble are those less than 10 micro-millimeters (approximately 1/2,500 of an inch) in diameter, because only these can get into the lungs.

Other authorities verify Dr. Sappington's assertion that only particles of 10 microns, or less, in diameter can enter the structure of the lungs.

Cement Dust Harmless

All authorities are agreed that cement dust is harmless, so far as the development of silicosis is concerned, but that it may induce minor respiratory diseases that result in lost-time cases.[2]

Dr. Fritz Schott (Germany), in an article in Concrete,[3] declares that cement dust and dust of stones other than those of high silica content are not harmful.

Another article in Concrete,[4] mentions a study made by the U. S. Public Health Service, from which the conclusion is reached that calcium dusts generated in the manufacture of portland cement are harmless. These conclusions, as previously intimated, are supported in the articles referred to in Note (2), appearing in the *Cement Mill Edition* of Concrete in April and May, 1930.

From the foregoing it is apparent that, with respect to silicosis, the danger point in cement mills is at the raw end and in the quarry, rather than in the grinding and packing departments, but that even the latter departments are conducive to the development of minor respiratory diseases.

Preventive Measures

In considering preventive measures, cement plant managers should look at the problem, and its solution, from several points of view. For example, it may be accepted as a foregone conclusion that racketeers, in casting about for new victims, will select a dusty cement plant in preference to one in which little dust is in evidence.

Similarly, a cement plant that maintains systematic medical examination of all men working in departments where dust is generated may be passed up, while one that neglects this precaution may be victimized.

---

[1] See Health Practices Pamphlet No. 4, published by National Safety Council, 20 No. Wacker Drive, Chicago.

[2] See articles in *Cement Mill Edition* of Concrete, April, 1930, pages 115-117; and May, 1930, pages 114-117.

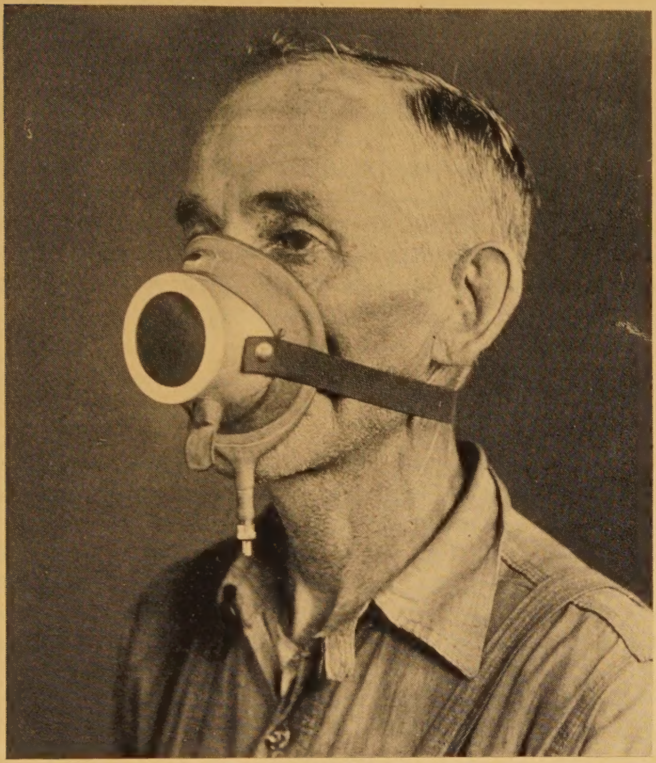
[3] *Cement Mill Edition* of Concrete, June, 1926, pages 108-111.

[4] *Cement Mill Edition* of Concrete, September, 1928, page 114.

It appears logical that the following precautionary measures should be taken at all cement plants where these measures have not already been introduced:

(1) Install dust-collecting equipment in all departments where dust is generated, especially at the raw end.

(2) Provide respirators for all workmen at points where stone dust is generated, especially if the stone has a high silica content. A case in point is that of a plant using blast-furnace slag as a raw material.



Respirator with felt filter, metal body and pneumatic rubber face cushion

(3) Introduce periodical medical examination of men working in dusty locations. If the lungs of a workman show any signs of becoming affected, he should be shifted to another department.

(4) Support efforts to include silicosis among the occupational diseases covered by state industrial compensation laws.

Not Included in Compensation Laws

No previous mention has been made of industrial compensation laws, covered in the last of the foregoing items; but this point is important.

Because of the comparatively recent development of interest in silicosis, only seven or eight states have included this disease as one of the occupational diseases covered by their industrial compensation laws.

Producers and manufacturers in states where silicosis is recognized in the compensation laws are fairly well protected. This takes the matter out of the scope of individual court actions. The idea of proving their case before the state board of medical examiners is one which racketeering lawyers do not relish. Even if a case is lost by the manufacturer, compensation will be made in the form of weekly payments—a prospect that is not attractive to lawyers working on a contingent fee basis.

No one can foresee how far the racketeering phase of this agitation will be carried; but in this connection manufacturers should remember that with the passing of prohibition, racketeers will feel compelled to extend their activities into new fields. The rapid growth of the crime of kidnapping testifies to the truth of the assertion just made.

Some Governmental Publications

Footnotes in this article contain several excellent references to published material on the subject of silicosis and its prevention. To these the following government reports may be added:

(1) Dust Respirators; Their Construction and Filtering Efficiency. Well illustrated pamphlet of 52 pages, by S. H. Katz. Published in 1926 as Technical Paper No. 394 of the U. S. Bureau of Mines. Price 15 cents.

(2) Problem of Dust Phthisis in the Granite-Stone Industry. Book of 178 pages, by F. L. Hoffmann. Published in 1922 as Bulletin No. 293 of the U. S. Bureau of Labor Statistics. Price not stated.

(3) Silicosis Among Miners. By R. R. Sayers. Published in 1925 as Technical Paper No. 372 of the U. S. Bureau of Mines. Price 15 cents.

Copies of the government bulletins can be obtained from the usual source—the Superintendent of Documents, Government Printing Office, Washington, D. C.

Finds Another Small-Quantity Use for Cement

A New York firm that markets colored cement recently received a telephone call from a manufacturer of glass flowers.

When a representative of the cement company called on the manufacturer the latter asked some questions about the possibilities of colored cement in his business. The result of the call was that the manufacturer of glass flowers now fills his china jardinieres about three-quarters full of ordinary gray cement mortar, on top of which he places a coating of green cement mortar. Green cement is also sprinkled on small stones that are spotted on the colored mortar coating.

One jardiniere utilizes only a very small quantity of gray cement, and a still smaller quantity of colored cement; but the total output of the plant is so great that this manufacturer of glass flowers is now a regular small-quantity purchaser of cement.

Lehigh Declares 87½-Cent Preferred Dividend

The Lehigh Portland Cement Co. has declared a dividend of 87½ cents on the cumulative preferred stock, payable October 1 to stock of record September 14. Similar dividend was paid in the previous quarter.

Ideal Dividend

A quarterly dividend of 25 cents a share on the capital stock of the Ideal Cement Co. was declared September 11, to be payable October 1, to stockholders of record September 15.

EDITORIAL

Pre-Mixed Masonry Cements

OUTSIDE the Pacific Coast region little is heard these days regarding the lessons taught by the southern California earthquake of March 10, 1933.

This lagging interest may be excused, in view of the national concentration on the great drive toward industrial recovery; but unless the construction industry re-directs its attention to Long Beach, the problems created by the earthquake will remain unsolved and the opportunities presented will not be followed through.

The cement industry, more than any other, has much to gain from the plain facts disclosed by investigators of the Long Beach earthquake; and among these facts one of the most obvious ones is the need for more cement in masonry mortars.

Notable among the many reports published is the one prepared for the members of Committee C-12 of the American Society for Testing Materials by Prof. Raymond E. Davis, chairman of the committee.

In his letter of transmittal Prof. Davis declares that the greatest single factor contributing to this damage was, without doubt, the very inferior quality of the masonry mortars.

In the body of his report Prof. Davis offers numerous proofs of the assertion just quoted. Then he points to the open door that leads to the cement manufacturer's opportunity.

"It is a well known fact," he says, "that in many buildings where cement mortars have been specified, very little cement has actually been used, and building code regulations concerning the proportioning of mortar-making materials have been disregarded."

To prevent this practice, the Davis report suggests that the only mortar cementing materials permitted on the construction site should be pre-mixed masonry cements, containing in themselves the necessary plasticizing materials, and meeting certain strength requirements. He would provide a severe penalty for violation of this regulation.

While the proposed regulation just mentioned would permit pre-mixing "at a central plant which may or may not be where the lime or the cement is manufactured," it is logical to believe that the masonry cements contemplated by the Davis report would gain the most ready acceptance if backed up by the name and trade-mark of a responsible manufacturer.

It is recognized, of course, that many masonry cements of this type are already on the market, most of which are produced at cement manufacturing plants and pre-proportioned in the quantities intended to be used.

But as yet our city building regulations do not require the use of masonry cements of these types. The predominant practice continues to be that of using a job mixture of portland cement and hydrated lime, these materials arriving on the construction site separately, in sacks. There is, accordingly, a constant temptation for the none-too-scrupulous contractor to reduce the proportion of cement and to increase the proportion of the lime plasticizer, until the quantity of cement is little more than "a dash of seasoning."

Changing building regulations is a slow and difficult procedure; but in the meantime the main purpose of the Davis report can be accomplished by educating architects and engineers to the importance of specifying pre-mixed masonry cements whose qualifications have been demonstrated.

An Antidote for Over-Specialization

AMONG the more than 3,000 persons who attended the record-breaking meeting of the American Chemical Society in Chicago last month, it is regrettable that the cement industry—one of the large and important chemical engineering industries—had but slight representation. At these meetings there is an exchange of much information of practical value to the manufacturer and user of cement. This is by no means restricted to the laboratory, but is applicable to research, design, construction, operation, control, and maintenance.

There were papers on metals and alloys—of which parts of buildings and nearly all machinery at cement plants are constructed; on the classification, constitution, and combustion of fuels; on natural and synthetic rubber—of interest in connection with the miles of rubber belts in cement plants, not to mention insulating materials and other rubber items; on boiler waters, lubricants, and paints.

After years of activity in a given branch of technology, the tendency is for one to lose sight of developments in other industries. The lectures, papers, discussions, and exhibits at American Chemical Society meetings offer excellent antidotes for over-specialization.

Credit to the Leaders

NOW that work on the NRA code for cement manufacturers is about concluded, the next step in its development will be adjustment to the code.

This adjustment on the part of individual plants will be no easy matter; but the same spirit of hard work and co-operative effort that has characterized the industry for some months will be equal to the further task of making the code workable.

Credit in full measure is due the leaders of the industry, whose unselfish labors have made these things possible.

Kinetic Elutriator Speeds Division of Sub-Sieve Particles

Classifies Fine Particles into Three Definite Size Groups —Method of Procedure Explained in Detail

By **A. L. CURTIS**
Chatteris, England

MANY strata of sand, silt and clay have been the result of natural elutriation, one of nature's most active influences in the geological formation of the earth's surface. The principle of elutriation consists essentially in subdividing the size of very fine mineral particles (too fine for classification by screening), into their various sized groups by physical action. Water and air are usually the two media by which this division is made; in the present article water is the medium dealt with. Previous to the design of scientific apparatus for classifying fine particles of inorganic matter, this was effected by the subsidence method, where a definite amount of clay or soil was stirred up in water in a graduated glass vessel. This was afterwards allowed to stand for some time, so the different grain sizes settled out consecutively in accordance with their size and weight, the smallest particles settling last and the clay alone remaining in suspension.

Early Procedure Too Tedious

The process described, however, was too tedious for practical use and eventually was superseded by hydraulic methods of elutriation, which, instead of allowing the fine particles to settle in still water, used an ascending current of regularly graded velocity so that particles were carried off in strict conformity with their respective sizes, or more accurately speaking, volume weights. When finely divided mineral matter has been in a current of water for a sufficient length of time the whole of the particles corresponding to a velocity of an upward current will be carried away and can be collected in a vessel, allowed to settle, dried and weighed. The velocity of current can then be adjusted to deal with the next size particles, which can be similarly collected, and so on down to the coarsest group.

For the purposes of standardization Seger's classification of velocities and grain sizes is generally accepted, this being originally laid down in connection with his work on clays, viz.:—

CLAY. Particles having a grain size of 0.010 mm. and less, carried away by a stream of water of velocity of 0.18 mm. per second.

ROCK DUST. Particles having a grain size of between 0.01 mm. and 0.025 mm., carried away by a stream of water of velocity 0.7 mm. per second.

SILT OR DUST SAND. Particles having a grain size of between 0.025 mm. and 0.04 mm., carried away by a stream of water of velocity 1.5 mm. per second.

FINE SAND. Particles having a grain size of between 0.04 mm. and 0.33 mm.

COARSE SAND. Particles having a grain size coarser than 0.33 mm.

Apparently the first scientific elutriator was brought out by Schultze, but later this was entirely superseded by those invented by Schoene and Hilgard. These elutriators were primarily designed for the mechanical analysis of soils and clays. Although Schoene's instrument was a great advance over the old sedimentation method, it was owing to Stadler's modification that we are indebted for some of the best original work in elutriation. This elutriator and that modified by T. Crook of the Imperial Institute, are too well known to be described here, and were the best laboratory pieces of apparatus available until the introduction of the Andrews elutriator.

The Controlling Factor

Theoretically the factor upon which the rate of classification mainly depends is the displacing force available for producing a movement of the solid particles which in gravity elutriation is indicated by the free falling velocity of the particle in water. This constant velocity is attained when the gain of momentum per second that would be attained by the particle falling *in vacuo* equals the loss of momentum per second due to the resistance to movement of the particle through the water. The gain of momentum is directly proportional to the mass or weight of the particle (in water) and the loss of momentum through resistance is proportional to the sectional area of the particle projected in its direction of motion and, but not directly, to the velocity of movement. In gravity elutriation under otherwise constant conditions, these forces are fixed and unalterable.

Since, however, momentum is the product of mass and velocity, it may obviously be increased to any desired extent by augmenting the acceleration of velocity due to gravity by means of an applied external force. Elutriation is dependent, therefore, upon velocity; it is also dependent upon the viscosity of the media and also its density. If the viscosity and density are made constant, the velocity only is the controlling factor. It is necessary, therefore, that the temperature shall be reasonably constant, in order that the viscosity shall be constant, and that the feed of material being elutriated shall be continuous and constant, in order that the density shall be the same throughout the test.

Basic Principle of Kinetic Elutriation

By varying the rising velocity of the water, it is therefore possible to control the point at which division of

---

From January (1933) issue of *Sands, Clays and Minerals*, Chatteris, England.

particle sizes takes place. In other words, the maximum size of the material which overflows, and the minimum size of the material which falls, can be determined by controlling the rising velocity. This is the basic principle of kinetic elutriation.

Centrifugal separators are examples of the principle of multiplying the force of gravity by means of an applied external force. These devices, like kinetic elutriators, have the effect of increasing the rate of displacement of solid particles and consequently of greatly reducing the floor space occupied.

The chief drawback to using most elutriators for determining the size of fine mineral particles is the time taken for making an analysis, as in addition to several hours' initial running, the matter of evaporating and drying the different residues occupies several days, and consequently results are not available for a considerable time. In addition, much room is required for vessels for storing the elutriate and the apparatus being very fragile can only be handled by a skilled operator.

The Andrews Elutriator

In spite of this engineers and chemists have for many years utilized the principle of elutriation for the classification of materials, but until the advent of the kinetic elutriator designed by Leonard Andrews, M.I.C.E., the practical application of elutriation to industry was a very difficult matter. The chief object of all designers of elutriators has been to accelerate the rate of classification in order that a result might be obtained on a representative sample within a reasonable time, and reduce the space occupied.

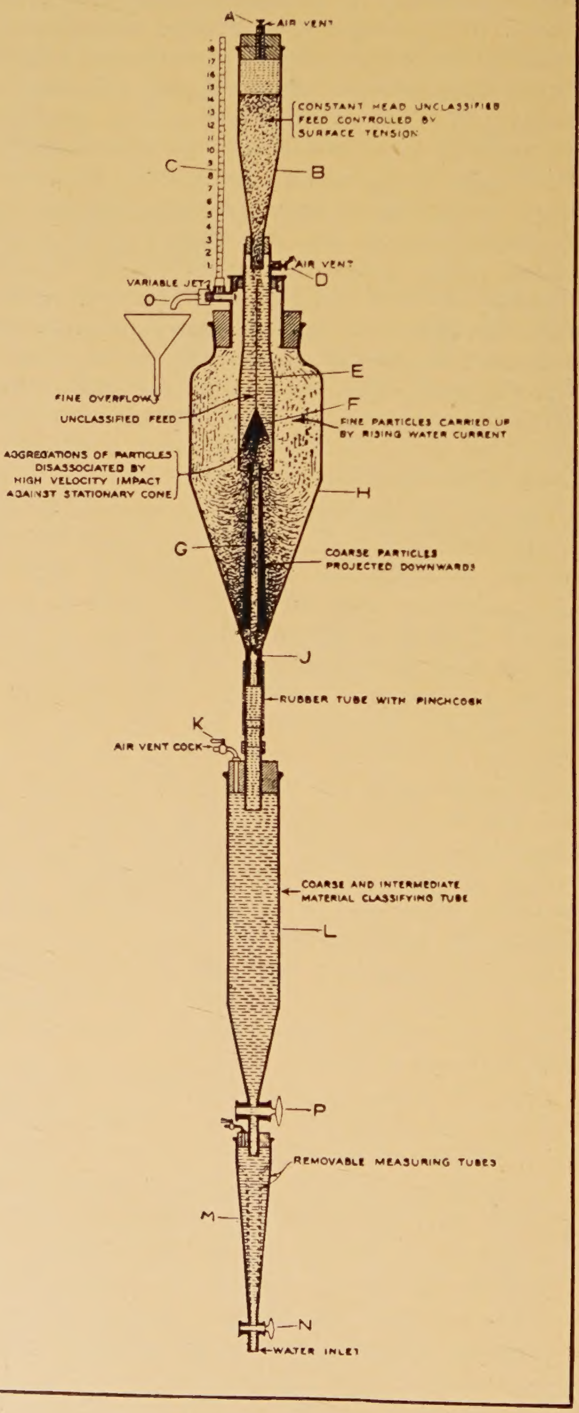
The Andrews elutriator here illustrated is built up of four main pieces, viz.:—Feed vessel or tube, *B;* large hydraulic classifier, *H;* intermediate classifier, *L;* graduated measuring vessel, *M.* These glass vessels are attached to a vertical pillar mounted on a cast iron stand, and held in position by clamping the two larger vessels with cork-lined clamps. All the vessels are of glass with definite sized internal diameters, and connected together with rubber bungs or tubing.

The feed vessel, *B,* is a cylindrical shaped tube, its bottom tapering about half way down, then drawn out parallel to fit a rubber bung connecting it with the large classifying vessel, *H,* placed beneath. This vessel has a capacity of approx. 60 cc., the top fitted with a ground glass lid, which in turn is again fitted with a glass stopper. The classifying vessel, *H,* consists of a large glass vessel, partly cylindrical and partly tapered, its bottom also terminating in a parallel stem for connecting to a lower or intermediate classifier. At the top a large rubber bung is fitted which provides a housing for carrying a metal fitting for holding the piezometer, *C,* and overflow, *O.* The metal fitting also carries a rubber bung connecting the classifying vessel, *H,* with the feed vessel. In addition, this metal fitting also carries a suspended glass tube, *E,* which acts as a guide for the material being elutriated entering the classifier, as well as a support for the metal cone washing device, *G,* which greatly accelerates kinetic action.

The intermediate classifier, *L,* is a cylindrical vessel, parallel for about three-quarters of its length, then tapered out to a thin stem, where a ground glass cock is fitted. This vessel is connected to the classifying vessel, *H,* by means of a rubber bung and strong rubber tubing, the latter having a heavy metal clip attached.

The fourth piece of apparatus is a tapered glass vessel, *M,* graduated in tenths, its bottom also being fitted with a ground glass stop cock. This latter vessel is also connected with the intermediate classifier, *L,* by means of a rubber bung. All vessels are provided with air vents at the top in the form of air vent cocks. As water enters the apparatus at the bottom of the tapered graduated vessel, *M,* by means of rubber tubing, its velocity is controlled by an adjustable clip fitted to the cast iron stand on which the apparatus is fixed.

In addition to the glass parts and metal stand described, an adjustable metal water-feeding device (shown in the


A
AIR VENT
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
CONSTANT HEAD UNCLASSIFIED FEED CONTROLLED BY SURFACE TENSION
C
B
AIR VENT
D
VARIABLE JET
O
E
FINE OVERFLOW
F
UNCLASSIFIED FEED
FINE PARTICLES CARRIED UP BY RISING WATER CURRENT
AGGREGATIONS OF PARTICLES DISASSOCIATED BY HIGH VELOCITY IMPACT AGAINST STATIONARY CONE
H
G
COARSE PARTICLES PROJECTED DOWNWARDS
J
RUBBER TUBE WITH PINCHCOCK
K
AIR VENT COCK
COARSE AND INTERMEDIATE MATERIAL CLASSIFYING TUBE
L
P
REMOVABLE MEASURING TUBES
M
N
WATER INLET

New Andrews kinetic elutriator

illustration) is provided to give a constant head of water. This is also clamped on to the stand, but being detachable it need not be used where an overhead water tank is provided. It might be mentioned here that where extensive elutriation is carried out, an overhead water tank will prevent many disappointments owing to varying pressure and breakdowns which sometimes occur in water mains.

Operation of Apparatus

To operate the instrument, water is admitted by opening the inlet cock *N* and the velocity is adjusted by means of the screw clip on the cast iron stand. The required velocity is indicated by the height of the water in the piezometer tube *C* but this should be primarily checked by measuring the volume of overflow in cc. per sec. Three interchangeable jets are provided in the overflow outlet *O*, which permit velocities in the upper vessel *H*, ranging from 0.2 to 2 mm. per second.

A 10-gram sample of the material to be elutriated, after boiling in a beaker with about 30 ccs. of water for some fifteen minutes, is well washed into the feed vessel *B*. The latter is completely filled with water to the exclusion of all air, the glass lid and stopper inserted. The feed tube *B* is then introduced into the large classifying vessel *H*, connection being made through the glass tube *E*, the feed being started by opening the air vent *D* which causes water to rise and submerge the bottom of the feed tube. The upward stream of water rising through the narrow outlet of the feed tube checks the downward descent of the solid particles, causing them to fall in a slow even-flowing stream through the annular space between the top *F* of the central fitting *G* and the tube *E* into the large conical vessel *H* forming the upper classifying chamber.

The solid particles quickly accumulate in the vessel *H* in the annular space between the bottom of the fitting *G* and the conical sides of the vessel thus causing the ascending current of water to flow through the narrow tube in the center of *G*. The particles are prevented by the upward current of water from falling into the vessel *L* but are carried up the tube *G* impinging at the top on the inverted cone *F*, which breaks up any accumulation, and those liberated are immediately carried off to the overflow without having to pass through an eddying mass of unclassified material.

Divided into Three Size Groups

The process is continued for about 2 hours until the upper part of the chamber *H* is clear, showing that all the finest particles have been carried off, and it remains to subdivide the residue into intermediate and coarse grains. This operation is carried out by first closing the stop cock *P* which allows the residue to fall into the classifying vessel *L*. When all has settled, the stop cock *P* is re-opened and the intermediate particles are carried back into the vessel *H*, where they are subjected to a final washing by continued circulation through and around the central fitting *G*. This washing operation is continued until the upper part of the vessel *L* is clear, when the strong pinch-cock between *H* and *L*, and the stop cock *N*, are closed simultaneously, thus allowing the coarse particles to descend into the graduated measuring cylinder *M*. The volume of particles in the measuring cylinder is noted and they are then discharged into a filter for drying and weighing, by removing the vessel and washing the particles out.

The cylinder *M* is then replaced and the current is restarted. When the velocity is normal again the stop cock *N* is once more closed, so that the intermediate particles descend into *M*, where they are similarly measured, removed, and collected for drying and weighing. In the meantime the overflow containing all the fine particles has been collected on a series of large filter papers, from which the residue is washed into a basin, evaporated, dried and weighed.

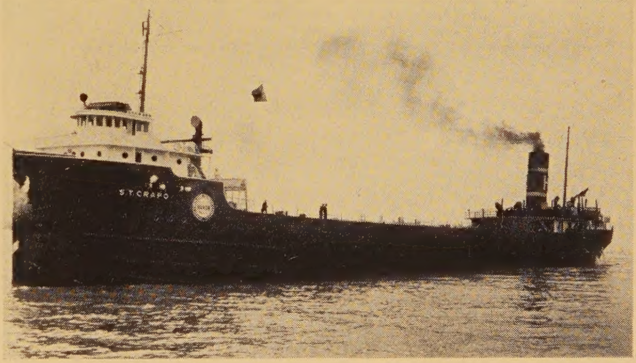
The test therefore gives three definite sized particle groups which can be calculated as percentage weights of the original material taken. Each group can be examined under the microscope and their respective sizes checked.

Huron Operates New Storage Plant

Serves Saginaw District from 25,000-Bbl. Plant at Carrollton

THE Huron Portland Cement Company has put its newly completed storage and packing plant at Carrollton, Mich., into service. The cement carrier "S. T. Crapo" delivered the first consignment of 17,000 bbl. of bulk cement from the company's Alpena plant, on September 5.

The storage and packing plant, located on the Saginaw River in Carrollton, just outside of Saginaw, Mich., has been designed to serve the construction requirements of the trade territory of Saginaw and Bay City, consisting of 23 counties.



Steamer *S. T. Crapo*, bulk cement carrier owned by the Huron Portland Cement Co.

The Carrollton plant has a capacity of 25,000 bbl., and is equipped to ship out 3,000 bbl. daily, either sacked or in bulk. The plant is equipped with modern cement-handling installations, and with packing equipment. Employment is being given to a force of about 30 men.

The steamer "S. T. Crapo," owned by the Huron Portland Cement Company, is one of the well-known bulk cement carriers operating on the Great Lakes. It is equipped with automatic unloading machinery, including automatic screws and compressed air pumps by means of which the bulk cement cargo is delivered to the storage bins of the distribution plant. The cement carrier has a capacity of 47,000 bbl. and requires about 20 hours to unload.

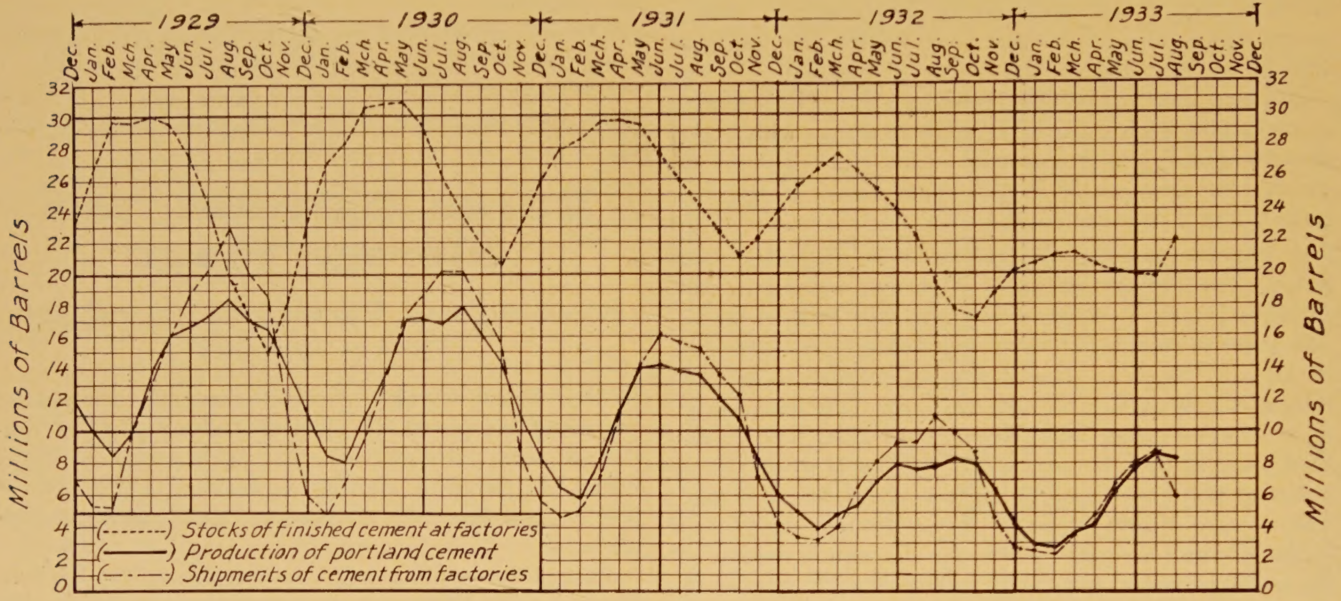
Cement Statistics for August

Relation of Production to Capacity (Per Cent)

	The Month	Twelve Months
August, 1933	35.9	26.5
August, 1932	34.2	32.1
July, 1933	37.6	26.3
June, 1933	35.2	26.0
May, 1933	27.4	26.0

Production, Shipments and Stocks of Finished Portland Cement (Barrels)

	1932	1933
Production, August	7,835,000	8,223,000
Shipments, August	10,968,000	5,994,000
Stocks at end of month	19,398,000	22,077,000
Production for year to date	49,650,000	44,500,000
Shipments for year to date	54,490,000	42,618,000



New Books and Pamphlets

Index of Economic Reports

Index of Economic Reports, published by the Metropolitan Life Insurance Co., 1 Madison Ave., New York. Stiff paper cover, 80 pages, 5¼ by 7¾ in. Single copies free on request.

Manufacturers who are searching for facts and ideas to be applied to making their operations more effective will find the key to a wealth of factual information on business methods in this new index. Listed in this publication are the titles of more than 500 reports and articles on problems of industrial management that have been published and made available for distribution by the Policyholders' Service Bureau of the insurance company.

Practically the entire range of business management is represented by the studies cataloged—advertising, selling and merchandising; credit and collections; budgeting; accounting and finance; purchasing; production management and engineering; personnel management; business research; and industrial health and safety.

Unemployment Insurance Handbook

Unemployment Insurance Handbook. Issued by the National Association of Manufacturers, 11 West 42nd Street, New York City. Paper cover, 224 pages, 6 by 9 in.

This publication is intended as a reference book for the use of manufacturing executives, legislators, teachers and students. While frankly arguing against the compulsory features of unemployment insurance, the book contains extensive data on plans that have been tried abroad, as well as the principal plans proposed in this country.

It is suggested that requests for copies be accompanied by requests for a 28-page memorandum by Roderic Olzendam, social insurance research director of the Metropolitan Life Insurance Co., containing a proposed voluntary employment assurance agreement between employers and employees.

PERSONAL

W. H. Klein has been appointed general operating manager of all Pennsylvania-Dixie Cement Corp. plants, with headquarters at Nazareth, Pa.

Less than 3 months ago he was appointed as assistant to President Blaine Smith, at the same time continuing as southern operating head.

Mr. Klein is a member of Committee C-1 of the A. S. T. M., and for a number of years has been chairman of the Technical Problems Committee of the Portland Cement Association, and is also a member of the American Concrete Institute.

Entering the industry in 1906 as chemist for the Kansas Portland Cement Co., Mr. Klein soon occupied the position of general superintendent and a few years later joined with the Dixie Portland Cement Co. at Richard City, Tenn., in the same capacity; he remained with that company until its acquisition by Penn-Dixie.

In addition to his activities in the cement industry, Mr. Klein is also vice-president of the Dixie Sand & Gravel Corp. and a director and member of the executive committee of the National Sand and Gravel Association.

High Early Strength with Wet Grinding

Clinker Ground for One Hour with 9.8 Per Cent of Water

IN a pamphlet by H. J. Mende, published by the Technische Hochschule, Braunschweig, Germany, and abstracted in the May (1933) issue of *Building Science Abstracts* (England), the author describes a process for the wet grinding of portland cement clinker.

Neat cement pastes were prepared from a commercial portland cement clinker ground dry without or with gypsum (1.5 per cent by weight) and mixed with 9.8 per cent of water and from the same clinker or clinker and gypsum mix ground for 1 hour with the same quantity of mixing water. Determinations of particle size, setting time (30 per cent of water), shrinkage and tensile and compressive strength were carried out. Parallel tests were made with commercial portland cement from the same clinker. The results are shown in the original paper in tabular form, by graphs, and by photomicrographs.

Effect of Wet Grinding

For clinker without gypsum considerably higher early strength was obtained by wet than by dry grinding; the difference in strength, however, decreased with time. For clinker with added gypsum wet grinding also gave higher strength, but the difference in early strength, especially compressive strength, was much less marked. The difference in strength obtained with wet and dry grinding is considered in relation to fineness, and to the process of hydration. The results of the setting and shrinkage tests are also considered.

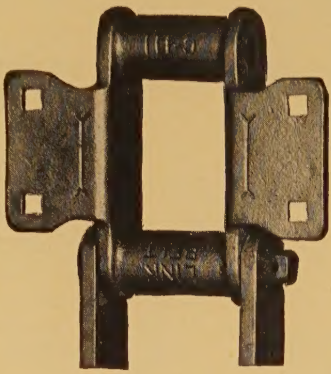
It was found that wet grinding of clinker without gypsum causes marked gel formation and higher early strength. The addition of gypsum seems to restrict gel formation but to have a favorable effect on "internal suction" and on later strength.

Rate of shrinkage and total shrinkage at 5 months of specimens prepared from wet ground clinker without gypsum are higher than for the clinker alone, ground dry. This indicates abundant formation of gel in the case of clinker ground wet. Clinker ground wet with gypsum exhibits no greater rate of shrinkage than clinker and gypsum ground dry and total shrinkage is lower.

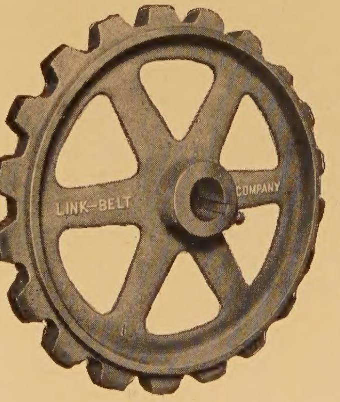
Conclusions

The general conclusion is reached that wet grinding of portland cement clinker without added gypsum promotes gel formation but reduces "internal suction"; wet grinding with gypsum fails to produce gel formation corresponding in extent to the increased fineness of the cement but intensifies and prolongs the hydration of the cement particles. It will be necessary to find by experiment the most suitable proportion of gypsum to be added to wet-ground portland cement clinker. The wet grinding of clinker would be suitable in works manufacturing concrete products, pipes, etc. In hot climates it would be more advantageous to transport clinker than the more sensitive ground material.

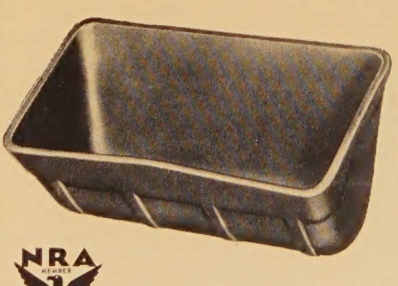
An Unbeatable Combination



CHAINS
Chains of steel, malleable iron or Promal, that stand up under the grueling conditions of cement mill operation. For conveying or power transmission, Link-Belt makes the correct size and type to fit your needs. Chains of Promal (the tried and proved, stronger, longer-wearing metal) should last twice as long as chains of malleable iron.



WHEELS
20,000 perfectly fitting Link-Belt sprockets, designed correctly to fit chains of standard pitch, are stocked at Philadelphia, Chicago, Detroit, San Francisco and Toronto, ready for immediate shipment. Made of gray iron or ≻ FLINT-RIM ≺ metal. We also make sprockets to order to meet any special requirements. Send for Stock List No. 1267.



BUCKETS
The Link-Belt "AAP" Promal Bucket embodies exclusive features and improvements in design which make it ideally suited for heavy-duty elevators. It is correctly reinforced at vital points, and furnished in all standard sizes.
Send for particulars.

NRA MEMBER U.S. WE DO OUR PART

4749
LINK-BELT COMPANY
Leading Manufacturers of Equipment
for Handling Materials Mechanically and Transmitting Power Positively
Indianapolis, Ewart Plant, 220 S. Belmont Ave.; Dodge Plant, 519 N. Holmes Ave.
Chicago Plant, 300 W. Pershing Rd.; Caldwell-Moore Plant, 2410 W. 18th St.
Philadelphia Plant, 2045 W. Hunting Park Ave. San Francisco Plant, 400 Paul Ave.
Offices in All Principal Cities
In Canada: Link-Belt Limited—Toronto Works; Montreal; Vancouver
LINK-BELT
See our exhibit at A Century of Progress, Chicago

MILL EQUIPMENT

New Industrial Tester Is Portable

A new portable a.c. testing set, known as the Industrial Analyzer, suitable for testing industrial apparatus and motors up to 100 hp. 440 volt, is announced by the Westinghouse Electric & Manufacturing Co., Schenectady, N. Y. Capable of making complete tests up to 125 amperes 500 volts a.c., the Analyzer is in reality a miniature, portable three-phase switchboard panel in a carrying case complete with all necessary switching equipment, transformers and resistors.

●

New Blasting Cap Hailed as Revolutionary

A new all-metal delay electric blasting cap, revolutionary in design, is announced by Hercules Powder Co., Wilmington, Del.

The outstanding features of the new detonator are the firing and delay elements that produce practically no gas when burning. These features make possible the use of a solid, one-piece, ventless shell.

The new delay cap, having no hot gas, cannot cause ignition of the dynamite. Needing no gas-escape openings in the shell, no moisture may enter, it is stated.

According to the manufacturer, the new type detonator represents the greatest advance in detonator construction since the invention of the electric blasting cap.

Hundreds of thousands of the new delays have been tested in the field with unvaryingly satisfactory results, according to Hercules explosives authorities. U. S. patents have been applied for on this new cap and are pending at this time.

●

Oil-Immersed, Explosion-Proof Switch Announced

A new oil-immersed, combination switch, designated as CR7008, has been announced by the General Electric Co. for use in Class I, Group D hazardous gas locations. The switch is available in three sizes for motors up to 50 hp. at 440-volts.

The combination switch consists essentially of three parts: a magnetic switch, a motor circuit switch, and a thermal overload relay which is reset by a plunger extending through the top cover. These parts, together with all connections, are located six inches below the surface of the oil in an oil-filled tank of welded construction. The tank, which is welded from heavy sheet steel, is supported from the top cover by four wing bolts. Handles on the sides of the tank facilitate its removal.

The magnetic switch used is of the same general construction as all General Electric magnetic switches. The motor circuit switch is a manual contactor with a sturdy snap-action, quick-make, quick-break mechanism.

Field Activities

Cedarburg Buys American Electric

The Cedarburg Manufacturing Co., Cedarburg, Wis., recently acquired the property and patents of the *American Electric Motor Co.*, formerly a subsidiary of the Splitdorf-Bethlehem Electrical Co., of Newark, N. J.

The Cedarburg Mfg. Co. will continue the manufacture of the American Electric motors in sizes from ½ to 30 hp. All American Electric motors have the highly desirable feature of removable stators as well as a very effective method of ventilation. Motors are supplied with standard sleeve bearings with cage construction. *Thorv. Hansen*, formerly works manager of the A. O. Smith Corp. of Milwaukee, is the president and general manager, and *Crawford Perego*, vice-president, will have charge of sales.

●

President of G. E. X-Ray Corp.

Directors of the *General Electric X-Ray Corp.*, of Chicago, on September 20 named *John H. Clough* president of the corporation to succeed *C. F. Samms*, who became chairman of the board. Mr. Clough was formerly assistant to the president, being located at Schenectady, where he acted as liaison between the x-ray unit and the research laboratory of the *General Electric Co.* The General Electric X-Ray Corp. is a wholly-owned subsidiary of General Electric.

The intention of making greater use of the talents and facilities of the *General Electric* research and general engineering laboratories at Schenectady in the improvement of the design of equipment is the purpose of the transfer of *A. L. Kimball* from the staff of the research laboratory to the engineering general department. In his new position Mr. Kimball will be associated with *A. R. Stevenson, Jr.*, and will assist all design engineering departments of the company on problems involving ventilation, vibration and noise, co-operating closely with the laboratories. Succeeding Mr. Kimball, *E. L. Thearle* will direct the activities of the mechanical research section of the research laboratory.

Industrial Literature

High Speed Synchronous Motors

A new publication entitled *Type G High Speed Synchronous Motors* has been issued by the *Westinghouse Electric and Manufacturing Co.* These motors with thermoguard protection are recommended for all types of constant speed machinery such as fans, blowers, compressors, pumps and are fully described in the leaflet.

Copies may be obtained from the nearest district office or direct from the advertising department, East Pittsburgh, Pa.

●

Milwaukee Manufacturer's Leaflet

A new publication of the *Allis-Chalmers Co.*, Milwaukee, Wis., is a 4-page leaflet on crushing, screening and washing plant machinery, numbered 2164. This is of a general nature and comprised in the main of equipment illustrations.

Units included are the Pulverator, Newhouse and other types of crushers, centrifugal vibrating screen, and crushing rolls.

●

Screw Conveyor Data Book

Link-Belt Company, Chicago, has just completed a 128-page *Data Book No.* 1289 on its Caldwell helicoid and sectional flight screw conveyor. The book is copiously illustrated, contains engineering data and list prices, and is said to be the most complete treatise ever published on the subject.

●

Dragon Contents

Contents of the August issue of *The Dragon* include articles on the history of anti-friction bearings, the equipment of caterpillar tractors with diesel power, and the introduction of a novel principle in new variable speed transmission.

The Dragon is published by the *Fafnir Bearing Co.*, New Britain, Conn., in the interest of anti-friction bearings.

●

The Older Employee

What business executives are doing to solve problems of the older employe in industry is told in a new report by the Policyholders Service Bureau of the *Metropolitan Life Insurance Co.* It is entitled *The Older Employe in Industry* and presents the findings of a broad survey of the subject.